

and support legislation to help screen, develop and produce viable substitutes.

As Dr. Rudd so ably pointed out, the toxic effects of lead and mercury have been known a long time but it has only been since the advent of leaded gasolines that worldwide contamination with lead has occurred. Fortunately, lead is now being phased out by most of the major gasoline companies, as these terrible long-term effects are being clearly defined. Mercury, mostly appearing in the environment as methyl mercury, widely used as a fungicide on seed and in the pulp industry, concentrated in the muscle of fish and in eggs of poultry that feed on mercury-contaminated grain, has caused toxic disasters in man consuming these foods. As a result of the widespread use of mercury compounds, biologic magnification of the effect is similarly occurring. Unless the use of mercury is stopped now, truly dangerous toxic effects will soon become evident and widespread.

It is imperative that the world not be the site of massive uncontrolled experimentation with any new chemical, no matter how exciting the initial effects appear to be. Each should be evaluated for biodegradability and the long-term effects upon the entire ecosystem.

## Semantic Pollutants

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THE PRINCIPAL CONTRIBUTION of modern psychiatry to the predominantly biophysically-oriented theories and practice of medicine is its emphasis on the interpersonal aspects of health and disease. It is concerned with the person who is ill and the social conditions of his existence. These psychosocial vectors appear as myth and tradition, belief-systems with their moral sanctions, political organization and activities, marketing techniques, and the like, and are mediated by non-verbal and verbal systems of communication. Analysis of human eco-systems, therefore, should include the role of "collective representations" that, to a pro-

found degree, govern the transactions between individuals and groups. Transmitted via the arts and literature of earlier as well as present generations, collective representations (including the structure of language itself) constitute the man-produced matrix called culture by which man's evaluations of himself and his environment are molded. That such mechanisms of human conditioning have produced psychophysiological degrees of anxiety sufficient to cause neurotic and psychotic incapacitation, violence directed against self and others, and a frenetic searching for panaceas and magical solutions is not only a matter of record but also constitutes a major public health problem today. Therefore, to our knowledge of biophysical vectors of disease must be added awareness of the role of psychosocial mechanisms of information collecting and retrieval. Communicable diseases are, at least in part, due to diseases of communication.

A verbal statement, a chemical equation or a mathematical formula is efficient only if it transmits with fidelity the relations between whatever is going on at macroscopic, microscopic or sub-microscopic levels. Like maps, such formulations must be similar in structure to the territory they were designed to represent. This is the reason why new languages of different structure are devised, such as higher mathematics, to avoid the structural limitations of older forms of representation. Our ordinary popular language, with its subject-predicate form, its elementalistic terms (for example, "mind," "body"), its tendency to equate parts with wholes, etc., transmits much false-to-fact information because of its primitive logical structure derived from preliterate macroscopic observation. There is little difference epistemologically between the simple cause and effect assumptions underlying exorcizing demons or destroying insect vectors; both procedures initiate sequential pathology neither implied nor predicted by the "logic" of the cause and effect statement in conventional language.

The structural assumptions conveyed by the unified field theories of modern science would avoid simplistic notions of cause and effect with their potentially dangerous consequences. We must, then, become aware of the structural or epistemological assumptions implicit in ordinary languages since, via the press and color television today, they produce and in great measure control the beliefs and assumptions, frequently uncon-

scious, which are guides to human social behavior. On the basis of such assumptions, deeply embedded in the collective representations of culture, humans have designed their nesting arrangements, defended their territory and polluted both. One might label as "semantic pollution" this malevolent effect of out-of-date, false-to-fact information that seemingly rationalizes man's manipulation of fellow man and his nurturing systems. For human values, transmitted by symbol systems derived from primitive ancestors, influence his behavior more than up-dated scientific knowledge of objective reality.

Like other causes of human and social malfunctioning that have been revealed and have become controllable through the biophysical sciences, semantic pollution is subject to investigation by the techniques of social anthropology, dynamic psychologies, epistemology, cybernetics, etc. It is remediable through methods derived from general semantics, linguistic revision, psychotherapy

and the educational techniques of the media, particularly television. As physicians, in an attempt to become aware of "all things present," as Galen advised for diagnosing human ailments, we must search for polluting effects of unconscious assumptions embedded in the very metaphors our patients use in describing their symptoms, such as "an attack of flu," "a raging headache," "a pain in the neck." We should observe posture, gesture and tone of voice as non-verbal communications of distress. By patient inquiry, we can ascertain how and when they may have experienced semantic contamination through reacting to conversations with others or to the exhortative pressures of the media. Or were they simply talking to themselves—so-called thinking? Only with awareness of the structural implications of ordinary language can we detect the pathogenetic significance of semantic pollutants effecting human ecosystems. Semantic decontamination could make health as contagious as disease.

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